

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Improvements in or relating to Extractor Fans

We, WOODS OF COLCHESTER LIMITED, of Braiswick Works, Colchester, Essex, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to extractor fans of the kind designed for mounting in an opening in the glass of a window, which fans are employed mainly, for example, for ventilating kitchens, bathrooms or other rooms of domestic premises.

One disadvantage of such fans as constructed hitherto is that they require the use of an external retaining ring for holding the main body of the fan in its operative position within the window opening, which retaining ring can only be put into position from outside the window, and this can lead to difficulties in the installation of a fan if the fan is required for a room situated at an appreciable height from the ground.

The object of the invention is to provide a form of fan incorporating a form of mounting arrangement which avoids this disadvantage.

According to the invention a fan of the kind referred to incorporates a flexible gasket insertable by deformation into a co-operating circular opening in the glass of a window and provided with flanges for engagement with the inner and outer surfaces of the glass around the opening for holding the gasket in position, an outer surround in the form of a split ring having an external diameter greater than that of the opening, but of a material sufficiently flexible to permit it to be opened into a short pitch helix so that it can be fed through the opening to an operative position in which it effectively covers the outer flange of the gasket, which

ring has locating surfaces designed for engagement with co-operating surfaces of the gasket and is associated with locking means for securing the ring in its operative position in engagement with the gasket, and support means for securing the main body of the fan to the ring when the ring is in its operative position.

The ring, which is conveniently formed of a suitable plastic, is preferably provided with two or more locking portions which project through the opening when the ring is fitted into its operative position, each of these portions being shaped to receive a spring clip, the locking portions and spring clips providing said locking means, and each clip being designed to engage a surface of the respective locking portion and to bear against the adjacent inner flange of the flexible gasket, so as to urge the said locating surfaces firmly in engagement with the said co-operating surfaces of the gasket.

The locking portions may, for example, take the form of three axially extending lugs spaced around the ring and provided with slots for receiving appropriately shaped spring clips and provided with retaining surfaces against which the clips are arranged to engage for locking the ring in its operative position.

The ring preferably includes a generally cylindrical locating portion which fits within the gasket when the ring is mounted in its operative position to secure the ring against transverse movement, this locating portion conveniently being formed with a slight taper, at least on its external surface, to facilitate the insertion of the portion within the gasket, and so that when the ring is locked in its operative position by the locking means the external surface of the locating portion is held firmly by wedge action in engagement with the radially inner surface of the gasket

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or with one or more projections formed integrally with the radially inner surface of the gasket.

5 The use of such internal projections has the advantage that they can be made to provide a degree of resilient suspension for the fan, since they can be constructed to be resiliently deformable when the ring is mounted in its operative position and under the weight of the fan, thereby reducing the transmission of vibration from the fan to the window glass, when the fan is in use, which vibration might otherwise be radiated from the glass as noise. The gasket may include at least one such internal projection in the form of an inwardly directed circumferential rib or a number of another such type of internal projections in the form of inwardly directed pads spaced around the internal surface of the gasket.

20 Preferably the base part of the gasket, that is to say, the part joining the inner and outer flanges, projects beyond the outer flange, the locating surfaces of the ring bearing against this projecting part when the ring is locked in its operative position. In this way the resilient suspension is not defeated by clamping pressure on the glass.

30 The outer flange of the gasket is preferably inclined towards the inner flange such that the gasket can accommodate itself to a range of varying glass thicknesses.

35 The support means for securing the main body of the fan conveniently comprises screws arranged to be screwed into co-operating holes in the spring clips, although other suitable means of attaching it to the ring can alternatively be employed.

40 The invention will be further explained by describing, by way of example, one particular extractor fan constructed in accordance with the invention with reference to the accompanying drawings in which :—

45 Figure 1 is an exploded perspective view of the extractor fan;

Figure 2 is a sectional elevation of the assembled fan through its axis; and

Figures 3 and 4 illustrate different steps in the installation of the fan.

50 Referring first to Figures 1 and 2, the fan 1 is designed for mounting within a circular opening 2 in the glass of a window 3 and comprises a main assembly 4 incorporating an annular channel shaped duct member 5 formed by a pair of coaxial generally cylindrical walls 6 and 7 joined at one end by an approximately flat annular base 8 and a housing 9 for the fan motor 10, the latter being supported coaxially within the duct member 5 by means of radially extending arms 12 joined at their outer ends to a surrounding ring 14 which is secured in any convenient manner to the annular base 8 of the duct member 5. The inner wall 6 of the duct member 5 provides the duct for the passage

of air through the fan, having an axial length somewhat longer than the outer wall 7 and flaring outwards at the end adjoining the annular base 8, which end is arranged to face inwards towards the room when the fan is mounted in its operative position. The motor shaft 18 carries a temperature resisting plastics moulding 19, suitable for insertion into the fan blade assembly 20 which is adapted to be held onto the plastics moulding by means of a screw (not shown). This fan blade assembly 20 comprises a number of fan blades 21 lying within the duct for producing an axial flow of air when the fan is operating, the air passing into the duct at the flared end and out of the opposite end in the usual manner of extractor fans of the form with which the present invention is concerned.

The inner wall 6 of the duct member 5 carries at its free end a hinged flap 24 arranged to be normally held open by a spring in operation of the fan, but capable of being held in the closed position by a releasable catch 16 to prevent a back-draught through the duct when the fan is not operating, and the inner end of the duct carries a detachable protective grille 25. Movement of the flap 24 is arranged to be controlled by a downwardly projecting cord 26 in the manner employed in known window-mounted fans.

Supply leads 27 for the fan motor and associated terminal connectors are housed between the two walls of the duct member and are protected by a part annular cover 15, the leads passing to the motor through one or more of the radial supporting arms 12 as shown in Figure 2.

The fan also incorporates a U-section rubber gasket 30 in the form of a ring having a pair of outwardly directed flanges 32 and 33, the gasket 30 being arranged to be fitted into the circular opening in the glass of the window 3 by deformation, with the flange 32 bearing against the inner surface 37 of the glass, and the other flange 33 applying pressure to the outer surface 38 of the glass. The outer flange 33 is sloped towards the opposite flange 32 so that it is opened out by the glass when fitted into the opening 2, the gasket 30 being thus able to accommodate itself to a range of varying glass thicknesses.

The base 40 of the gasket 30 extends for a short distance beyond the outer flange 33 as at 68 and also carries on its inner surface an inwardly directed annular rib 42 formed integrally with the gasket, this rib helping to prevent ingress of water into the main duct and also providing a resilient support for the fan as will subsequently be described.

For providing a mounting for the main fan assembly, the fan also includes, in accordance with the invention, an outer surround

44 in the form of a split ring of a suitable plastics material having a gap 55 and comprising a generally cylindrical portion 45 tapering slightly towards one end 46, and provided at the other end with an outwardly-directed flange 48 with a back-turned rim 49. Three lugs 51, spaced approximately uniformly around the ring 44 and whose function will be later described, project axially from the slightly tapered end 46 of the ring, and radial webs 47 extend between the outer surface of the generally cylindrical portion 45 and the inner surface of the back-turned rim 49 in alignment with each of these lugs.

The portion 45 of the outer surround 44 is designed to be mounted within the gasket 30 and to enable this to be readily effected the outer surround 44 is made sufficiently flexible to permit it to be opened out into a short pitch helix 53 as shown in Figure 3. The gap 55 in the ring 44 can be fed through the opening 2 in the window 3, with the gasket 30 already in position, from inside the room, the whole of the circumference of the outer surround being passed successively outside by an eccentric rotary movement of the surround. The outer surround is manoeuvred around until the split 55 lies at the bottom and is then manually held in position with the tapered portion 45 lying within the gasket 30 and being located against transverse movement by engagement with the inwardly directed rib 42 of the gasket 30 and the outwardly directed flange 48 effectively covering the outer flange 33 of the gasket 30 outside the window, the radial webs 47 of the surround 44 engaging against the outwardly projecting part 68 of the base 40 of the gasket 30 and thus act as locating surfaces for the ring. The webs 47 are so designed that when in engagement with the gasket 30 the edge of the back turned rim 49 of the surround 44 is spaced slightly from the glass. To close the outer surround 44 and to ensure that it provides a firm base for mounting the main body 4 of the fan a bridging member 58 is provided, this being snapped into two convenient holes one on either side of the split 55 in the ring upon mounting the outer surround 44 in its operative position. To secure the surround 44 against the gasket 30 a retaining clip 57 is fitted which clamps the surround 44 against the gasket in the aperture 2 (Figure 4).

Spring clip devices 59 are then fitted into axially directed slots 60 in the lugs 51 of the split ring and are pressed firmly into engagement with the inner flange 32 of the gasket 30. Spring fingers 62 on the clips 59 engage cooperating retaining surfaces within the slots 60 of the lugs 51, and prevent withdrawal of the clips from the slots, the split ring 44 then being held firmly in position against the gasket 30 by the clips 59. Each of the clips 59 is conveniently formed of

spring metal strip bent into the form of a rectangular bridge, the central part of which is slightly wider than the two arms of the bridge, and this central part is arranged to slide into opposed grooves formed in the sides of the slot 60 of a respective lug 51 to cause the leading arm to engage and be pressed against the inner flange of the gasket. The spring fingers 62 are conveniently formed by stamping them in the central part of the clip, the ends of the fingers being so shaped that they dig slightly into the respective retaining surface when pushed into the slot 60, and so secure the clips against withdrawal.

Referring now again to Figure 1 the main body 4 of the fan which comprises the duct member 5 and attachments, including the fan motor 10 and blade assembly 20, is then secured in position within the ring 44 by three screws 63 which are passed through holes in the annular base of the duct member and which are screwed into cooperating holes 64 in the adjacent arms of the spring clips 59, the rim 69 of the outer wall of the duct member 5 bearing against the inner flange 32 of the rubber gasket 30; the assembly is arranged to be fitted into position with the hinge 65 of the external flap 24 uppermost, the hinge 65 being protected by a short horizontal extension 67 projecting from the outer surround immediately above it.

It will be seen that the mounting of the whole fan assembly 1 can be effected entirely from within the room and access to the outside of the window 3 as is normally required for window-mounted fans as constructed hitherto is not required.

By arranging that the radial webs 47 of the ring 44 bear against the projecting part 68 of the base 40 of the gasket 30, rather than on the external flange 33 of the gasket, clamping pressure on the glass 3 is avoided. This assists in providing a resilient mounting for the fan, this being additionally provided by the inwardly directed rib 42 on the gasket 30 which bears resiliently against the external surface of the tapered part 45 of the outer surround 44 when the latter is fixed in position.

The outer flange 48 of the surround 44 also forms a gutter which conducts rain water travelling down the glass and across the outer flange 33 of the gasket 30 circumferentially around until it drips away harmlessly from below.

In one alternative arrangement in accordance with the invention, the gasket may additionally or alternatively to the rib 42 be provided with a number of deformable pads arranged to project radially inwards so as to bear directly against, and provide a resilient mounting for, the main body of the fan when the latter is secured to the ring, the cylindrical locating portion of the ring being interrupted at appropriate positions to permit the

respective pads to extend into contact with the main body of the fan.

In a further alternative arrangement, the cylindrical portion 45 of the ring and/or the inner wall 6 of the main body of the fan may be formed with, or carry, projections on the radially outer surface thereof designed to engage the radially inner surface of the gasket when fitted into position.

#### 10 WHAT WE CLAIM IS:—

1. A fan of the kind referred to incorporating a flexible gasket insertable by deformation into a cooperating circular opening in the glass of a window and being provided with flanges for engagement with the inner and outer surfaces of the glass around the opening for holding the gasket in position, an outer surround in the form of a split ring having an external diameter greater than that of the opening, but of a material sufficiently flexible to permit it to be opened into a short pitch helix thereby enabling it to be fed through the opening to an operative position in which it effectively covers the outer flange of the gasket, which ring has locating surfaces designed for engagement with cooperating surfaces of the gasket and is associated with locking means for securing the ring in its operative position in engagement with the gasket, and support means for securing the main body of the fan to the ring when the ring is in its operative position.

2. A fan as claimed in claim 1 wherein said outer surround is provided with two or more locking portions which project through said opening when the ring is fitted into its operative position, each of these portions being shaped to receive a spring clip, the locking portions and spring clips providing said locking means, and each clip being capable of being retained by engagement with a cooperating surface of the respective locking portion and bearing against the adjacent inner flange of the flexible gasket, so as to urge the said locating surfaces firmly in engagement with the said cooperating surfaces of the gasket.

3. A fan as claimed in claim 2 wherein said locking portions take the form of axially extending lugs spaced around said ring.

4. A fan as claimed in claims 1, 2 or 3 wherein said split ring includes a generally cylindrical locating portion which fits within the gasket when the ring is mounted in its operative position and secures the ring against transverse movement, this locating portion being formed with a slight taper at least on its external surface, to facilitate the insertion of the portion within the gasket, and so that when the ring is locked in its operative position by the locking means the external surface of the locating portion is held firmly by wedge action in engagement with the gasket.

5. A fan as claimed in claim 4 wherein the gasket has one or more projections formed integrally with the inner surface of the gasket which are so constructed as to be resiliently deformable by the ring when the latter is secured in its operative position.

6. A fan as claimed in claim 5 wherein the projection is in the form of a radially inwardly directed circumferential rib.

7. A fan as claimed in claim 5 wherein the gasket includes a plurality of projections in the form of pads spaced around and formed integrally with the radially inner surface of the gasket.

8. A fan according to any previous claim wherein the base part of the gasket projects beyond the outer flange and the locating surfaces of the ring bear against this projecting part when the ring is locked in its operative position.

9. A fan according to any previous claim wherein the outer flange of the gasket is inclined towards the inner flange such that the gasket can accommodate itself to a range of varying glass thicknesses.

10. A fan according to Claim 2 or any one of claims 3 to 9 when appendant thereto wherein the said support means for securing the main body of the fan comprises screws arranged to screw into cooperating holes in the spring clips.

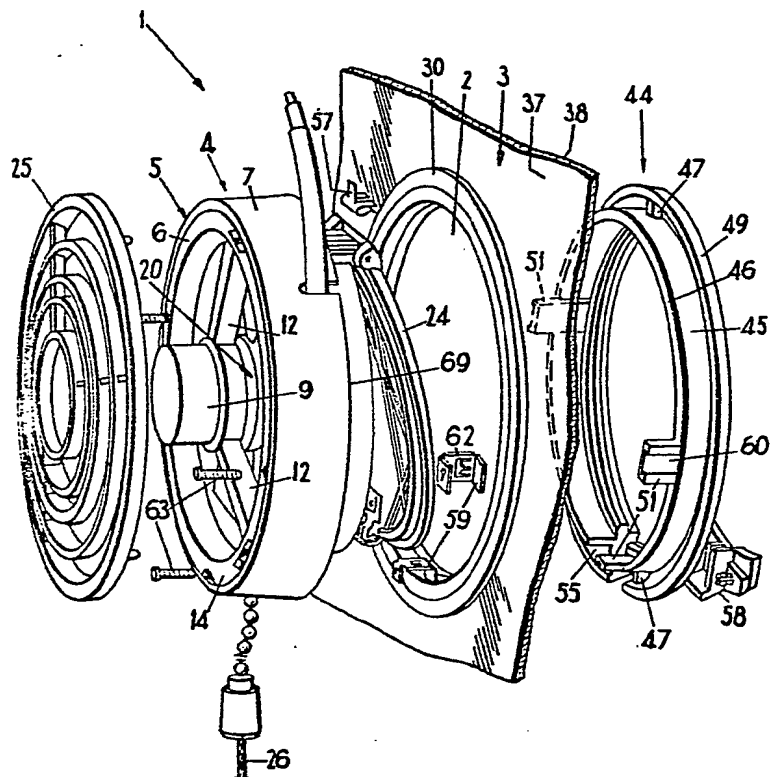
11. A fan substantially as hereinbefore described with reference to and as shown in the figures of the accompanying drawings.

For the Applicants,  
H. V. A. KIRBY,  
Chartered Patent Agents.

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Sheet 1



**Fig.1**

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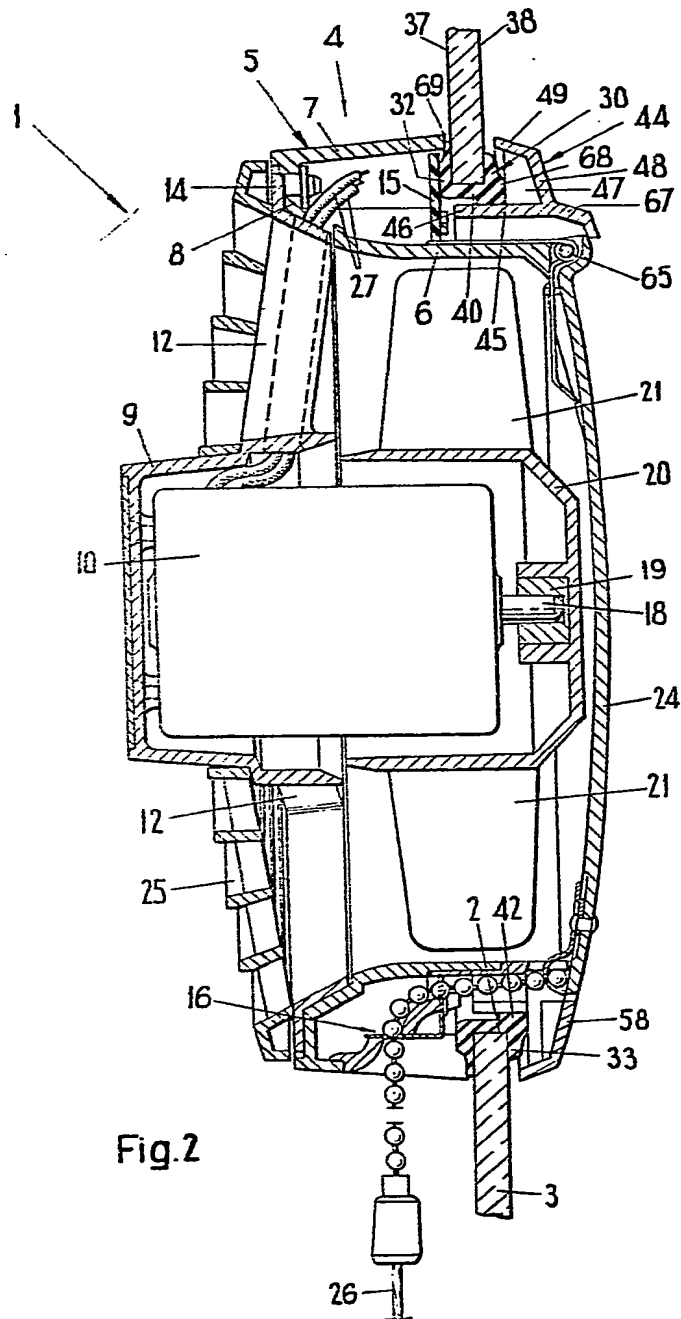


Fig.2

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Sheet 3

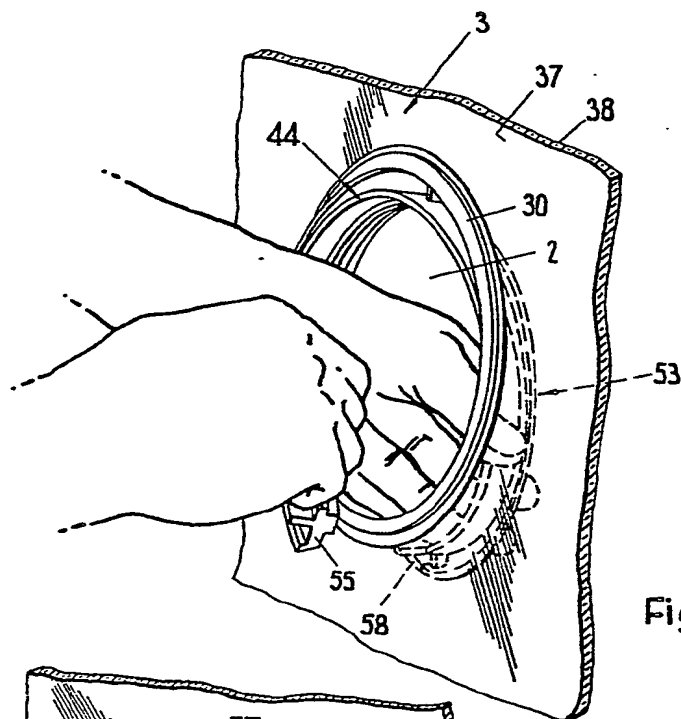


Fig.3

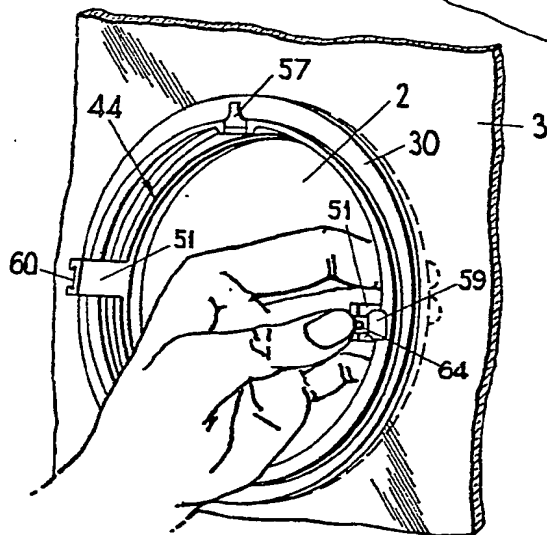


Fig.4

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